

FORT COLLINS SCIENCE CENTER INTERNATIONAL CENTER FOR APPLIED ECOLOGY

CAPABILITIES

Many natural resource issues are global and international in nature, including both causes and consequences. Migrating birds cross national boundaries, some declining and endangered species require habitat in more than one country, and biological species that are native to one country or continent can become costly invaders when they are established elsewhere. Solutions to international resource problems require cooperation among disciplines, coordination among agencies and universities, and agreements between nations. The International Center for Applied Ecology of the Fort Collins Science Center (FORT) is integrating science to address a variety of international natural resource problems, including neotropical migratory birds and bats in the Western Hemisphere; sustainable economic development and conservation in China; ecological risk management in Argentina; snow leopard and red-crowned crane conservation in Asia; several comparative ecology studies involving invasive plants in the U.S.; plague; and the endangered black-footed ferret and its Asian counterpart, the Siberian polecat. Biodiversity studies in central Asia use new technology such as satellite telemetry for tracking wildlife and DNA analysis for improving censusing methods.



Restoring and preserving natural systems globally depends increasingly on exchanging knowledge and expertise across nations. FORT brings scientists from other countries to the U.S. to build experience, share expertise, and generate a federal scientist network for use in this country and by countries of guest scientists. FORT scientists also offer technical assistance and training in cooperating countries.

SELECTED PROJECTS



Conserving Ecological and Cultural Diversity Through Sustainable Development. Many developing countries are seeking economic development strategies that will sustain their biological and cultural resources. For example, the Yunnan and Sichuan Provinces in Southwest China are among China's most biologically and culturally diverse. Twenty-six of China's 55 minority cultures have significant populations there, and poverty rates are high. Ecosystems range from tropical rain forests to 18,000-foot mountains. The U.S. Geological Survey (USGS)



is cooperating with provincial governments, universities, and the Chinese Academy of Sciences (CAS) to build economic development methods that will sustain biological and cultural diversity. Workshops held in the U.S. have trained Chinese scientists in connecting economic development, conservation biology, and GIS/GAP technologies. Currently, these integrated practices are being implemented in pilot projects in the Yunnan and Sichuan Provinces. In 2003, USGS and CAS will evaluate the pilot projects and extend activities to include invasive non-native spe-

cies that move between China and the U.S. The techniques developed in Yunnan and Sichuan will be used in other western China provinces and applied elsewhere in the developing world.

Conservation Biology of Giant Tortoises in Galapagos.

FORT research and management programs focused on the giant tortoises endemic to Galapagos involve studies of population biology, effects of introduced species, and *in situ* breeding and rearing of the most endangered populations. These efforts are followed by returning tortoises to native habitats that have been restored by parallel conservation programs involving control of introduced species, recovery of native plants communities, and management of human impacts. FORT scientists work closely with the Charles Darwin Foundation and Galapagos National Park on reptile biology and introduced species issues. Programs in the Galapagos National Park closely mirror major emphases of biological research capabilities of the USGS, including endangered species, introduced species management, GIS, and ecosystem management. All field aspects are conducted in Galapagos, Ecuador, but ancillary studies are conducted at FORT and in collaboration with cooperators at Yale University and the University of New Mexico.



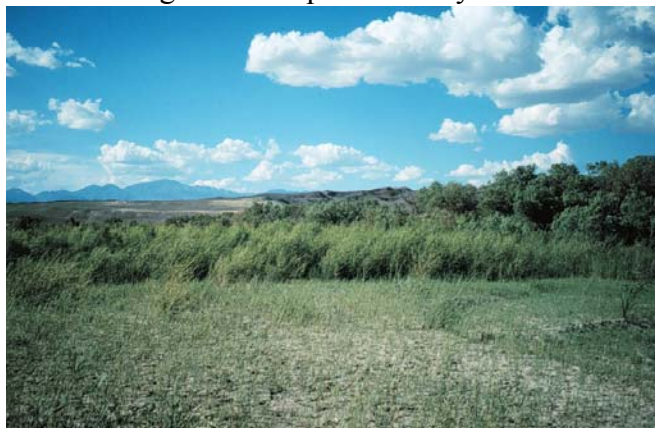
Effects of Mining in Latin America. Developing countries in Latin America have vast potential mineral wealth that could be used to spur regional economies, but the rate at which these countries develop their resources could have serious consequences on natural resources and human health. To help prevent such impacts, FORT and the Servicio Geológico Minero Argentino produced a short course, *The Effects of Mining: Environmental, Human Health, and Ecological Risk Analysis*, for more than 70 scientists, engineers, planners, and medical personnel. The course covered the various facets of risk analysis as well as chemical, biological, and human health monitoring.

Migratory Birds in Latin America. The USGS and the Universidad Nacional de Salta are collaborating on a project sponsored by the National Geographic Society to study waterbirds of the southern altiplano. Nine Landsat ETM images (245,000 km²) for six classes of aquatic bird habitats have been mapped and will be made available to the public on an interactive web site. Additionally, work with two universities and other cooperators in Argentina is investigating stable isotope analyses of feathers as a means of identifying wintering and breeding grounds of long-distance migrants and the migratory routes they follow.



Comparisons of Black-footed Ferret and Siberian Polecat. FORT scientists are collaborating with the Chinese Ministry of Forestry, the Northeast Forestry University in China, and the Institute of Biology in Russia on research to assist the restoration efforts of the endangered black-footed ferret in the U.S. FORT scientists are studying the ecology of the Siberian polecat, a member of its subgenus, as a surrogate for the black-footed ferret, whose restoration depends on captive propagation and survival after release into the wild. In order to identify potential problems with the release of captive-bred black-footed ferrets, this study uses radio-telemetry to compare movements, activity, and mortality of natural populations of Siberian polecats with populations that have been released from captivity. Genetic variation between the black-footed ferret and the Siberian polecat is being evaluated using molecular techniques. Comparative behavioral studies between captive black-footed ferrets and Siberian polecats are also being conducted. The research results are being applied to restoration plans guiding ferret recovery efforts in the U.S.

River and Stream Riparian Ecosystem Process Studies. Objectives of international activities associated with this project are twofold. First is to bring management expertise and scientific understanding of mechanisms gained in one country to bear on understanding related riparian ecosystems in other countries. Secondly, FORT scientists aim to work effectively on aspects of riparian ecosystem dynamics that are inherently international because they involve movement of species, water, or water-borne materials across national boundaries. Early steps have involved synthesizing information from international scientists and translating articles about riparian systems in arid and semi-arid landscapes, primarily Eurasia. In addition, international site visits have been conducted to become familiar with these related riparian systems and develop collaborative proposals. Of par-



ticular interest to FORT scientists is the autoecology of the plant genus *Tamarix* in its native range because of its extensive spread as an invasive species in riparian areas of the western U.S.

STAFF

Acting Science Director: Don O. Hunter

Ph.D. Ecologist: ecology, international conservation, information systems.

Boyle, Terence, Ph.D. Ecologist: biological and ecological indicators, ecotoxicology, ecological risk assessment.

Johnson, Richard L., M.S. Economist: ecological economics, international and development economics, resource economics and public policy, adaptive modeling and management.



CONTACT INFORMATION

Don O. Hunter

U.S. Geological Survey
Fort Collins Science Center
2150 Centre Avenue, Building C
Fort Collins, CO 80526-8118
Tel. 970.226.9382
Fax 970.226.9230
don_o_hunter@usgs.gov

FORT Online provides information about FORT scientists, projects, publications and other products, science features, and much more.

Visit the FORT website at <http://www.fort.usgs.gov>

Learn more about the International Center for
Applied Ecology Program at
<http://www.fort.usgs.gov/research/600/600.asp>